Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Learner Registration Number

Pearson BTEC Level 3 Nationals Certificate, Extended Certificate, Foundation Diploma, Diploma, Extended Diploma

Time 40 minutes

Paper reference **31617H/1B**

Applied Science/Forensic and Criminal Investigation

UNIT 1: Principles and Applications of Science I
Biology
SECTION A: STRUCTURES AND FUNCTIONS OF CELLS AND TISSUES

You must have:
A calculator and a ruler.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The exam comprises three papers worth 30 marks each:
  - Section A: Structures and Functions of Cells and Tissues (Biology)
  - Section B: Periodicity and Properties of Elements (Chemistry)
  - Section C: Waves in Communication (Physics).
- The total mark for this exam is 90.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P67521A

©2022 Pearson Education Ltd.

1/1/1/1/1/1/1/

P 6 7 5 2 1 A 0 1 1 2

Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 The bacterium *E. coli* is a prokaryotic cell.

Figure 1 shows an image of an *E. coli* bacterium.

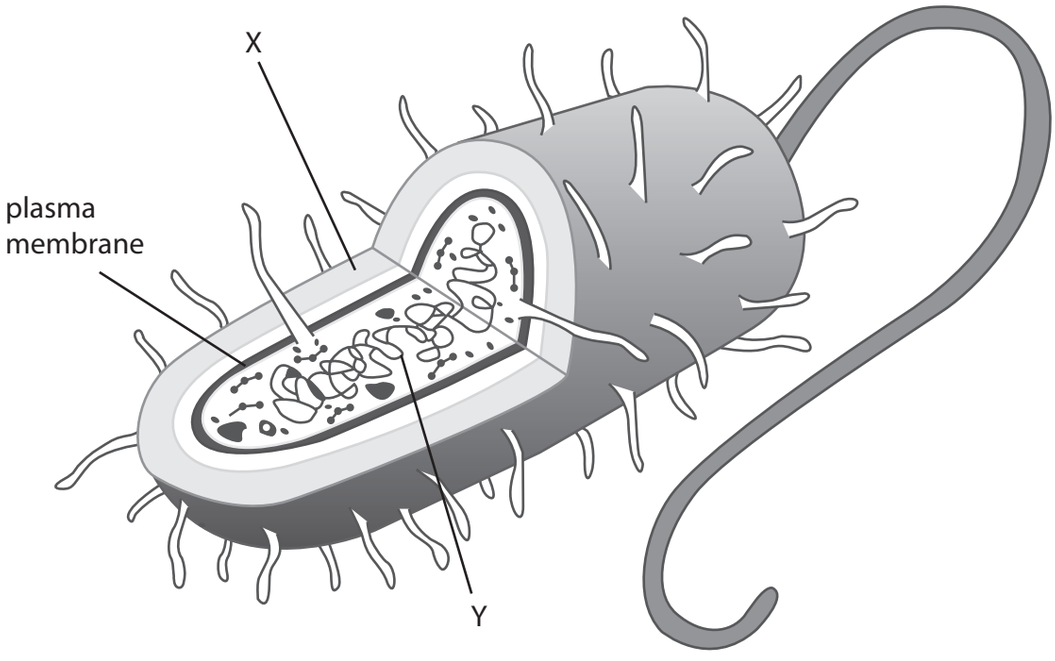


Figure 1

(a) (i) Identify structure X in Figure 1.

(1)

☒ **A** capsule

☒ **B** cell wall

☒ **C** plasmid

☒ **D** ribosome

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) The nucleoid is made of structure Y.

Identify structure Y in Figure 1.

(1)

.....

(iii) State **one** function of the plasma membrane.

(1)

.....

.....

(b) Eukaryotic cells contain a nucleus instead of a nucleoid.

Give **one** feature of the nucleus that is **NOT** found in the nucleoid.

(1)

.....

.....

(Total for Question 1 = 4 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

2 Animal cells and plant cells are eukaryotic.

Animal cells and plant cells contain mitochondria.

(a) Identify which process happens inside mitochondria.

(1)

- ☒ **A** aerobic respiration
- ☒ **B** crossbridge formation
- ☒ **C** fertilisation
- ☒ **D** phagocytosis

(b) Complete Table 1 to show which organelles are found in animal cells and which organelles are found in plant cells.

The first row has been completed for you.

(3)

organelle	found in animal cells	found in plant cells
cell wall	No	Yes
ribosomes		
cytoplasm		
amyloplasts		

Table 1

(c) A palisade mesophyll cell is a specialised plant cell.

Explain **one** feature of a palisade mesophyll cell that helps it to photosynthesise.

(2)

.....

.....

.....

.....

(Total for Question 2 = 6 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

3 Egg cells and sperm cells are two specialised cells found in humans.

Figure 2 shows a diagram of an egg cell and a sperm cell. They are not drawn to scale.

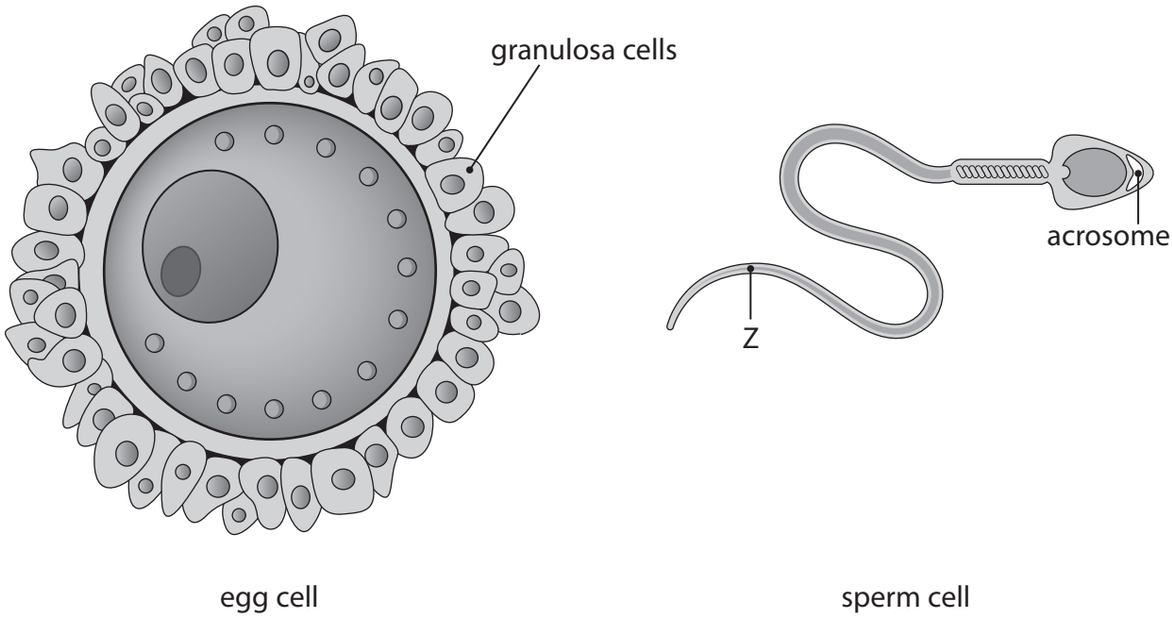


Figure 2

(a) State the function of the structure labelled Z in Figure 2.

(1)

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) Paragraph 1 describes the role of the sperm cell head in penetrating the egg cell during fertilisation.

The sperm cell penetrates the granulosa cells of the ..R.. .

The head of the sperm cell binds with the ..S.. of the egg cell.

The sperm head releases ..T.. to digest the glycoprotein protective coat of the egg cell.

Paragraph 1

Identify the missing words R, S and T in Paragraph 1.

(3)

R .....

S .....

T .....

(c) A sperm cell and an epithelial cell each contain a nucleus.

State **one** difference between the nucleus of a sperm cell and the nucleus of an epithelial cell.

(1)

.....

.....

(Total for Question 3 = 5 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

4 Chronic obstructive pulmonary disease (COPD) is a common disease in the UK.

(a) Give **one** cause of COPD.

(1)

.....

(b) Figure 3 shows the number of people, per 100,000 population, diagnosed with COPD from 2004 to 2012 in the UK.

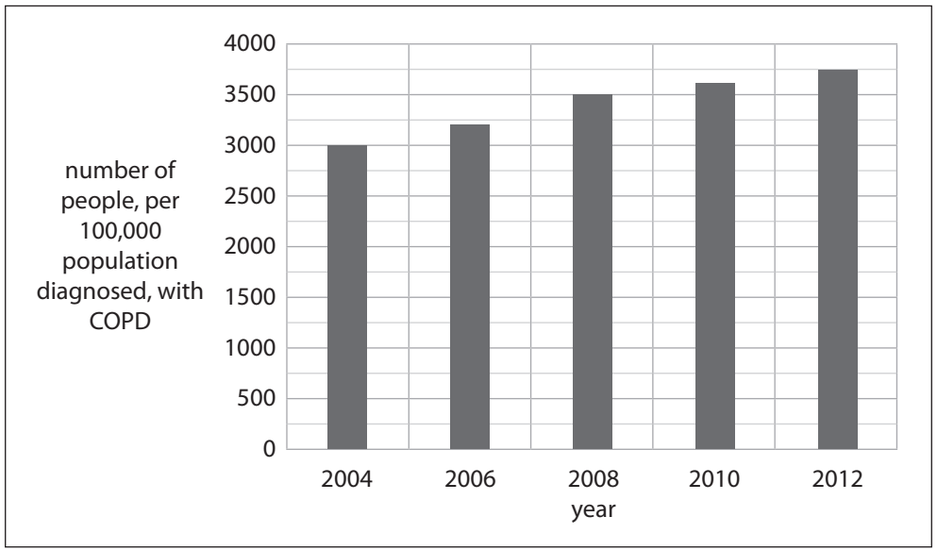


Figure 3

Calculate the percentage increase in the number of people diagnosed with COPD, per 100,000 population, from 2004 to 2012.

Use the information in Figure 3.

(4)

Show your working.

percentage increase = ... %

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) Figure 4a shows a photomicrograph of alveoli from a healthy person.

Figure 4b shows a photomicrograph of alveoli from a person with COPD.

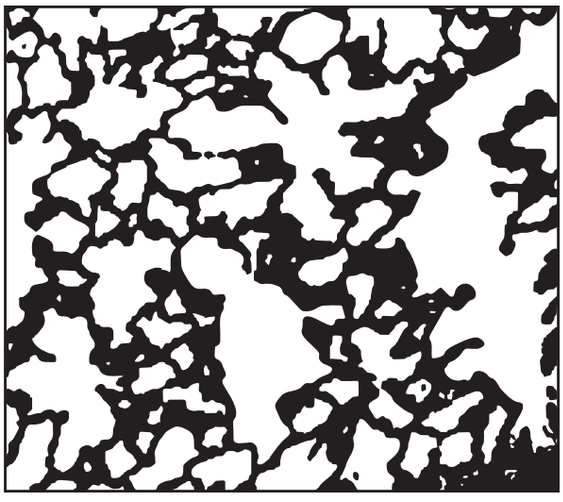


Figure 4a

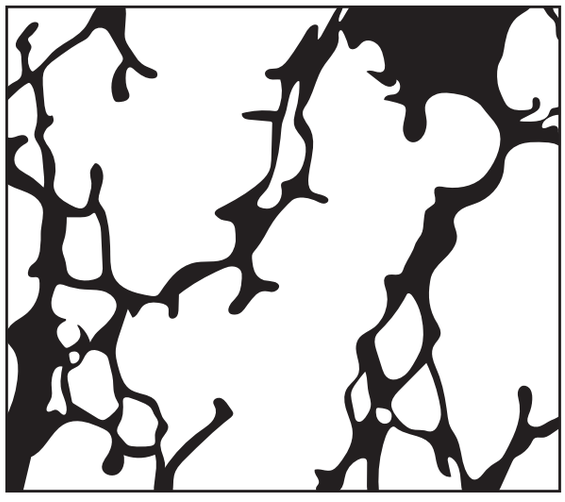


Figure 4b

COPD reduces the efficiency of gas exchange in the lungs.

Explain why.

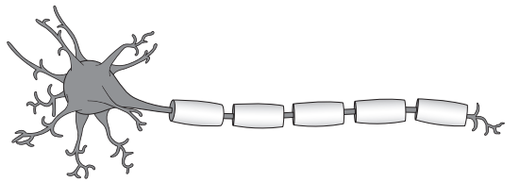
(4)

(Total for Question 4 = 9 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

5 Figure 5a shows the structure of a myelinated neurone.

Figure 5b shows the structure of a non-myelinated neurone.



myelinated neurone

Figure 5a

non-myelinated neurone

Figure 5b

Discuss the reasons for the differences in the speed of impulse conduction along myelinated and non-myelinated axons.

(6)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(Total for Question 5 = 6 marks)

TOTAL FOR SECTION A = 30 MARKS

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA